

# Industry/TSTF Standard Technical Specification Change Traveler

## Operability of Turbine Stop Valve and Turbine Control Valve Fast Closure Bypass Trip Functions

Classification: 4) Change Bases

NUREGs Affected:  1430  1431  1432  1433  1434

**Description:**

The Bases for NUREG-1433, Rev. 1 and NUREG-1434, Rev. 1, Sections 3.3.1.1, RPS Instrumentation, and 3.3.4.1, EOC-RPT Instrumentation, for the Turbine Control Valve Fast Closure, Trip Oil Pressure - Low, and Turbine Stop Valve - Closure, include a statement, "therefore, to consider this Function OPERABLE, the turbine bypass valves must remain shut at THERMAL POWER > 30%/40% (BWR/6) RTP." This generic change proposes to modify the Bases description of these Functions to state that "because an increase in the main turbine bypass flow can affect this function nonconservatively (THERMAL POWER is derived from turbine first stage pressure), the main turbine bypass valves must not cause the trip Function to be bypassed in order to maintain this Function OPERABLE when thermal power is >= 30%/40% RTP." The change eliminates an unnecessary restriction in NUREG-1433 and NUREG-1434 which requires these TS Functions to be declared inoperable to perform monthly Turbine Bypass Valve Testing required by SR 3.7.7.1.

**Justification:**

This change is acceptable, because the trip Functions would only be disabled, and therefore rendered inoperable, if sufficient steam was bypassed to result in a lower turbine first stage pressure and the actual bypassing of the trip Functions occur. At power levels greater than 30% RTP, the affect of opening a single Turbine Bypass valve will not necessarily result in a bypassing of the trip functions. By defining the OPERABILITY requirement as simply requiring the Turbine Bypass valves to be closed, this unnecessarily requires the trip Functions to be declared inoperable during required TS Testing. Furthermore, if the Functions are bypassed, an alarm in the control room will identify the condition to control room operators. Therefore, this change will maintain the requirement for OPERABILITY of the trip Functions and remove the need to unnecessarily declare the Functions inoperable.

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### Revision History

<b>OG Revision 0</b>	<b>Revision Status: Active</b>	<b>Next Action: NRC</b>
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Revision Proposed by: Susquehanna

Revision Description:  
Original Issue

### Owners Group Review Information

Date Originated by OG: 19-May-97

**Owners Group Comments**

Editorial changes made to the description at the 8/13/97 BWROG meeting and the change was expanded to BWR/6.

Owners Group Resolution: Approved Date: 13-Aug-97

### TSTF Review Information

TSTF Received Date: 13-Aug-97 Date Distributed for Review 01-Dec-97

OG Review Completed:  BWOG  WOG  CEOG  BWROG

9/24/99

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**OG Revision 0**

**Revision Status: Active**

**Next Action: NRC**

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TSTF Comments:

(No Comments)

TSTF Resolution: Approved      Date: 24-Sep-99

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**Incorporation Into the NUREGs**

File to BBS/LAN Date:

TSTF Informed Date:

TSTF Approved Date:

NUREG Rev Incorporated:

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**Affected Technical Specifications**

S/A 3.3.1.1 Bases      RPS Instrumentation

S/A 3.3.4.1 Bases      EOC-RPT Instrumentation

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INSERT 1 (BWR/4)

Because an increase in the main turbine bypass flow can affect this function nonconservatively (THERMAL POWER is derived from turbine first stage pressure), the main turbine bypass valves must not cause the trip Function to be bypassed when thermal power is  $\geq 30\%$  RTP.

INSERT 2 (BWR/6)

Because an increase in the main turbine bypass flow can affect this function nonconservatively (THERMAL POWER is derived from turbine first stage pressure), the main turbine bypass valves must not cause the trip Function to be bypassed when thermal power is  $\geq 40\%$  RTP.

BASES

APPLICABLE  
SAFETY ANALYSES,  
LCO, and  
APPLICABILITY

8. Turbine Stop Valve—Closure (continued)

Insert J

stage pressure, therefore, to consider this function OPERABLE, the turbine bypass valves must remain shut at THERMAL POWER  $\geq$  30% RTP.

The Turbine Stop Valve—Closure Allowable Value is selected to be high enough to detect imminent TSV closure, thereby reducing the severity of the subsequent pressure transient.

Eight channels of Turbine Stop Valve—Closure Function, with four channels in each trip system, are required to be OPERABLE to ensure that no single instrument failure will preclude a scram from this Function if any three TSVs should close. This Function is required, consistent with analysis assumptions, whenever THERMAL POWER is  $\geq$  30% RTP. This Function is not required when THERMAL POWER is  $<$  30% RTP since the Reactor Vessel Steam Dome Pressure—High and the Average Power Range Monitor Fixed Neutron Flux—High Functions are adequate to maintain the necessary safety margins.

9. Turbine Control Valve Fast Closure, Trip Oil Pressure—Low

Fast closure of the TCVs results in the loss of a heat sink that produces reactor pressure, neutron flux, and heat flux transients that must be limited. Therefore, a reactor scram is initiated on TCV fast closure in anticipation of the transients that would result from the closure of these valves. The Turbine Control Valve Fast Closure, Trip Oil Pressure—Low Function is the primary scram signal for the generator load rejection event analyzed in Reference 7. For this event, the reactor scram reduces the amount of energy required to be absorbed and, along with the actions of the EOC-RPT System, ensures that the MCPR SL is not exceeded.

Turbine Control Valve Fast Closure, Trip Oil Pressure—Low signals are initiated by the electrohydraulic control (EHC) fluid pressure at each control valve. One pressure transmitter is associated with each control valve, and the signal from each transmitter is assigned to a separate RPS logic channel. This Function must be enabled at THERMAL POWER  $\geq$  30% RTP. This is normally accomplished

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BASES

APPLICABLE  
SAFETY ANALYSES,  
LCO, and  
APPLICABILITY

9. Turbine Control Valve Fast Closure, Trip Oil  
Pressure—Low (continued)

automatically by pressure transmitters sensing turbine first stage pressure, therefore, to consider this Function OPERABLE, the turbine bypass valves must remain shut at THERMAL POWER  $\geq$  30% RTP.

Insert 1

The Turbine Control Valve Fast Closure, Trip Oil Pressure—Low Allowable Value is selected high enough to detect imminent TCV fast closure.

Four channels of Turbine Control Valve Fast Closure, Trip Oil Pressure—Low Function with two channels in each trip system arranged in a one-out-of-two logic are required to be OPERABLE to ensure that no single instrument failure will preclude a scram from this Function on a valid signal. This Function is required, consistent with the analysis assumptions, whenever THERMAL POWER is  $\geq$  30% RTP. This Function is not required when THERMAL POWER is  $<$  30% RTP, since the Reactor Vessel Steam Dome Pressure—High and the Average Power Range Monitor Fixed Neutron Flux—High Functions are adequate to maintain the necessary safety margins.

10. Reactor Mode Switch—Shutdown Position

The Reactor Mode Switch—Shutdown Position Function provides signals, via the manual scram logic channels, to each of the four RPS logic channels, which are redundant to the automatic protective instrumentation channels and provide manual reactor trip capability. This Function was not specifically credited in the accident analysis, but it is retained for the overall redundancy and diversity of the RPS as required by the NRC approved licensing basis.

The reactor mode switch is a single switch with four channels, each of which provides input into one of the RPS logic channels.

There is no Allowable Value for this Function, since the channels are mechanically actuated based solely on reactor mode switch position.

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BASES

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APPLICABLE  
SAFETY ANALYSES,  
LCO, and  
APPLICABILITY

Turbine Stop Valve—Closure (continued)

Closure of the TSVs is determined by measuring the position of each valve. There are two separate position switches associated with each stop valve, the signal from each switch being assigned to a separate trip channel. The logic for the TSV—Closure Function is such that two or more TSVs must be closed to produce an EOC-RPT. This Function must be enabled at THERMAL POWER  $\geq$  30% RTP. This is normally accomplished automatically by pressure transmitters sensing turbine first stage pressure; therefore, to consider this Function OPERABLE, the turbine bypass valves must remain shut at THERMAL POWER  $>$  30% RTP. Four channels of TSV—Closure, with two channels in each trip system, are available and required to be OPERABLE to ensure that no single instrument failure will preclude an EOC-RPT from this Function on a valid signal. The TSV—Closure Allowable Value is selected to detect imminent TSV closure.

Insert 1

This protection is required, consistent with the safety analysis assumptions, whenever THERMAL POWER is  $\geq$  30% RTP. Below 30% RTP, the Reactor Vessel Steam Dome Pressure—High and the Average Power Range Monitor (APRM) Fixed Neutron Flux—High Functions of the Reactor Protection System (RPS) are adequate to maintain the necessary safety margins.

Turbine Control Valve Fast Closure, Trip Oil Pressure—Low

Fast closure of the TCVs during a generator load rejection results in the loss of a heat sink that produces reactor pressure, neutron flux, and heat flux transients that must be limited. Therefore, an RPT is initiated on TCV Fast Closure, Trip Oil Pressure—Low in anticipation of the transients that would result from the closure of these valves. The EOC-RPT decreases reactor power and aids the reactor scram in ensuring that the MCPR SL is not exceeded during the worst case transient.

Fast closure of the TCVs is determined by measuring the electrohydraulic control fluid pressure at each control valve. There is one pressure transmitter associated with each control valve, and the signal from each transmitter is assigned to a separate trip channel. The logic for the TCV Fast Closure, Trip Oil Pressure—Low Function is such that two or more TCVs must be closed (pressure transmitter trips)

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BASES

APPLICABLE  
SAFETY ANALYSES,  
LCO, and  
APPLICABILITY

Turbine Control Valve Fast Closure, Trip Oil Pressure—Low  
(continued)

to produce an EOC-RPT. This Function must be enabled at THERMAL POWER  $\geq$  30% RTP. This is normally accomplished automatically by pressure transmitters sensing turbine first stage pressure; therefore, to consider this Function OPERABLE, the turbine bypass valves must remain shut at THERMAL POWER  $>$  30% RTP. Four channels of TCV Fast Closure, Trip Oil Pressure—Low, with two channels in each trip system, are available and required to be OPERABLE to ensure that no single instrument failure will preclude an EOC-RPT from this Function on a valid signal. The TCV Fast Closure, Trip Oil Pressure—Low Allowable Value is selected high enough to detect imminent TCV fast closure.

Insert 1

This protection is required consistent with the safety analysis whenever THERMAL POWER is  $>$  30% RTP. Below 30% RTP, the Reactor Vessel Steam Dome Pressure—High and the APRM Fixed Neutron Flux—High Functions of the RPS are adequate to maintain the necessary safety margins.

ACTIONS

Reviewer's Note: Certain LCO Completion Times are based on approved topical reports. In order for a licensee to use the times, the licensee must justify the Completion Times as required by the staff Safety Evaluation Report (SER) for the topical report.

A Note has been provided to modify the ACTIONS related to EOC-RPT instrumentation channels. Section 1.3, Completion Times, specifies that once a Condition has been entered, subsequent divisions, subsystems, components, or variables expressed in the Condition, discovered to be inoperable or not within limits, will not result in separate entry into the Condition. Section 1.3 also specifies that Required Actions of the Condition continue to apply for each additional failure, with Completion Times based on initial entry into the Condition. However, the Required Actions for inoperable EOC-RPT instrumentation channels provide appropriate compensatory measures for separate inoperable channels. As such, a Note has been provided that allows separate Condition entry for each inoperable EOC-RPT instrumentation channel.

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BASES

APPLICABLE  
SAFETY ANALYSES,  
LCO, and  
APPLICABILITY

8.a, b. Scram Discharge Volume Water Level—High  
(continued)

Four channels of each type of Scram Discharge Volume Water Level—High Function, with two channels of each trip system, are required to be OPERABLE to ensure that no single instrument failure will preclude a scram from these Functions on a valid signal. These Functions are required in MODES 1 and 2, and in MODE 5 with any control rod withdrawn from a core cell containing one or more fuel assemblies, since these are the MODES and other specified conditions when control rods are withdrawn. At all other times, this Function may be bypassed.

9. Turbine Stop Valve Closure, Trip Oil Pressure—Low

Closure of the TSVs results in the loss of a heat sink that produces reactor pressure, neutron flux, and heat flux transients that must be limited. Therefore, a reactor scram is initiated at the start of TSV closure in anticipation of the transients that would result from the closure of these valves. The Turbine Stop Valve Closure, Trip Oil Pressure—Low Function is the primary scram signal for the turbine trip event analyzed in Reference 4. For this event, the reactor scram reduces the amount of energy required to be absorbed and, along with the actions of the End of Cycle Recirculation Pump Trip (EOC-RPT) System, ensures that the MCPR SL is not exceeded.

Turbine Stop Valve Closure, Trip Oil Pressure—Low signals are initiated by the electrohydraulic control (EHC) fluid pressure at each stop valve. Two independent pressure transmitters are associated with each stop valve. One of the two transmitters provides input to RPS trip system A; the other, to RPS trip system B. Thus, each RPS trip system receives an input from four Turbine Stop Valve Closure, Trip Oil Pressure—Low channels, each consisting of one pressure transmitter. The logic for the Turbine Stop Valve Closure, Trip Oil Pressure—Low Function is such that three or more TSVs must be closed to produce a scram.

This Function must be enabled at THERMAL POWER  $\geq$  40% RTP. This is normally accomplished automatically by pressure transmitters sensing turbine first stage pressure;

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therefore, to consider this Function OPERABLE, the turbine

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BASES

APPLICABLE  
SAFETY ANALYSES,  
LCO, and  
APPLICABILITY

9. Turbine Stop Valve Closure, Trip Oil Pressure—Low  
(continued)

INSERT 2

~~bypass valves must remain shut at THERMAL POWER  $\geq$  40% RTP~~  
The setpoint is feedwater temperature dependent as a result of the subcooling changes that affect the turbine first stage pressure/reactor power relationship. For RTP operation with feedwater temperature  $\geq$  420°F, an allowable setpoint of  $\leq$  26.9% of control valve wide open turbine first stage pressure is provided by the bypass function. The allowable setpoint is reduced to  $\leq$  22.5% of control valve wide open turbine first stage pressure for RTP operation with feedwater temperature  $>$  370°F and  $<$  420°F.

The Turbine Stop Valve Closure, Trip Oil Pressure—Low Allowable Value is selected to be high enough to detect imminent TSV closure thereby reducing the severity of the subsequent pressure transient.

Eight channels of Turbine Stop Valve Closure, Trip Oil Pressure—Low Function, with four channels in each trip system, are required to be OPERABLE to ensure that no single instrument failure will preclude a scram from this Function if any three TSVs should close. This Function is required, consistent with analysis assumptions, whenever THERMAL POWER is  $\geq$  40% RTP. This Function is not required when THERMAL POWER is  $<$  40% RTP since the Reactor Vessel Steam Dome Pressure—High and the Average Power Range Monitor Fixed Neutron Flux—High Functions are adequate to maintain the necessary safety margins.

10. Turbine Control Valve Fast Closure, Trip Oil Pressure—Low

Fast closure of the TCVs results in the loss of a heat sink that produces reactor pressure, neutron flux, and heat flux transients that must be limited. Therefore, a reactor scram is initiated on TCV fast closure in anticipation of the transients that would result from the closure of these valves. The Turbine Control Valve Fast Closure, Trip Oil Pressure—Low Function is the primary scram signal for the generator load rejection event analyzed in Reference 4. For this event, the reactor scram reduces the amount of energy required to be absorbed and, along with the actions of the EOC-RPT System, ensures that the MCPR SL is not exceeded.

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BASES

APPLICABLE  
SAFETY ANALYSES,  
LCO, and  
APPLICABILITY

10. Turbine Control Valve Fast Closure, Trip Oil  
Pressure—Low (continued)

Turbine Control Valve Fast Closure, Trip Oil Pressure—Low signals are initiated by the EHC fluid pressure at each control valve. There is one pressure transmitter associated with each control valve, the signal from each transmitter being assigned to a separate RPS logic channel. This Function must be enabled at THERMAL POWER  $\geq$  40% RTP. This is normally accomplished automatically by pressure transmitters sensing turbine first stage pressure;

INSERT 2

therefore, to consider this Function OPERABLE, the turbine bypass valves must remain shut at THERMAL POWER  $>$  40% RTP.

The basis for the setpoint of this automatic bypass is identical to that described for the Turbine Stop Valve Closure, Trip Oil Pressure—Low Function.

The Turbine Control Valve Fast Closure, Trip Oil Pressure—Low Allowable Value is selected high enough to detect imminent TCV fast closure.

Four channels of Turbine Control Valve Fast Closure, Trip Oil Pressure—Low Function, with two channels in each trip system arranged in a one-out-of-two logic, are required to be OPERABLE to ensure that no single instrument failure will preclude a scram from this Function on a valid signal. This Function is required, consistent with the analysis assumptions, whenever THERMAL POWER is  $\geq$  40% RTP. This Function is not required when THERMAL POWER is  $<$  40% RTP since the Reactor Vessel Steam Dome Pressure—High and the Average Power Range Monitor Fixed Neutron Flux—High Functions are adequate to maintain the necessary safety margins.

11. Reactor Mode Switch—Shutdown Position

The Reactor Mode Switch—Shutdown Position Function provides signals, via the manual scram logic channels, that are redundant to the automatic protective instrumentation channels and provide manual reactor trip capability. This Function was not specifically credited in the accident analysis, but it is retained for the overall redundancy and diversity of the RPS as required by the NRC approved licensing basis.

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BASES

APPLICABLE  
SAFETY ANALYSES,  
LCO, and  
APPLICABILITY

Turbine Stop Valve Closure, Trip Oil Pressure—Low  
(continued)

Closure of the TSVs is determined by measuring the EHC fluid pressure at each stop valve. There is one pressure transmitter associated with each stop valve, and the signal from each transmitter is assigned to a separate trip channel. The logic for the TSV Closure, Trip Oil Pressure—Low Function is such that two or more TSVs must be closed to produce an EOC-RPT. This Function must be enabled at THERMAL POWER  $\geq$  40% RTP. This is normally accomplished automatically by pressure transmitters sensing turbine first stage pressure; therefore, to consider this Function OPERABLE, the turbine bypass valves must remain shut at THERMAL POWER  $\geq$  40% RTP. Four channels of TSV Closure, with two channels in each trip system, are available and required to be OPERABLE to ensure that no single instrument failure will preclude an EOC-RPT from this Function on a valid signal. The TSV Closure, Trip Oil Pressure—Low Allowable Value is selected high enough to detect imminent TSV closure.

INSERT 2

This protection is required, consistent with the safety analysis assumptions, whenever THERMAL POWER is  $\geq$  40% RTP with any recirculating pump in fast speed. Below 40% RTP or with the recirculation in slow speed, the Reactor Vessel Steam Dome Pressure—High and the Average Power Range Monitor (APRM) Fixed Neutron Flux—High Functions of the Reactor Protection System (RPS) are adequate to maintain the necessary safety margins.

The automatic enable setpoint is feedwater temperature dependent as a result of the subcooling changes that affect the turbine first stage pressure/reactor power relationship. For operation with feedwater temperature  $\geq$  420°F, an Allowable Value setpoint of  $\leq$  26.9% of control valves wide open turbine first stage pressure is provided for the bypass function. The Allowable Value setpoint is reduced to  $\leq$  22.5% of control valve wide open turbine first stage pressure for operation with a feedwater temperature between 370°F and 420°F.

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BASES

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APPLICABLE  
SAFETY ANALYSES,  
LCO, and  
APPLICABILITY  
(continued)

TCV Fast Closure, Trip Oil Pressure—Low

Fast closure of the TCVs during a generator load rejection results in the loss of a heat sink that produces reactor pressure, neutron flux, and heat flux transients that must be limited. Therefore, an RPT is initiated on TCV Fast Closure, Trip Oil Pressure—Low in anticipation of the transients that would result from the closure of these valves. The EOC-RPT decreases reactor power and aids the reactor scram in ensuring that the MCPR SL is not exceeded during the worst case transient.

Fast closure of the TCVs is determined by measuring the EHC fluid pressure at each control valve. There is one pressure transmitter associated with each control valve, and the signal from each transmitter is assigned to a separate trip channel. The logic for the TCV Fast Closure, Trip Oil Pressure—Low Function is such that two or more TCVs must be closed (pressure transmitter trips) to produce an EOC-RPT. This Function must be enabled at THERMAL POWER  $\geq$  40% RTP. This is normally accomplished automatically by pressure transmitters sensing turbine first stage pressure;

~~therefore, to consider this Function OPERABLE, the turbine bypass valves must remain shut at THERMAL POWER  $\geq$  40% RTP.~~ INSERT 2

Four channels of TCV Fast Closure, Trip Oil Pressure—Low, with two channels in each trip system, are available and required to be OPERABLE to ensure that no single instrument failure will preclude an EOC-RPT from this Function on a valid signal. The TCV Fast Closure, Trip Oil Pressure—Low Allowable Value is selected high enough to detect imminent TCV fast closure.

This protection is required consistent with the analysis, whenever the THERMAL POWER is  $\geq$  40% RTP with any recirculating pump in fast speed. Below 40% RTP or with recirculation pumps in slow speed, the Reactor Vessel Steam Dome Pressure—High and the APRM Fixed Neutron Flux—High Functions of the RPS are adequate to maintain the necessary safety margins. The turbine first stage pressure/reactor power relationship for the setpoint of the automatic enable is identical to that described for TSV closure.

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ACTIONS

Reviewer's Note: Certain LCO Completion Times are based on approved topical reports. In order for a licensee to use

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